Zero Retries issue 0130 2023-12-22

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 1100+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

In this issue:

- **Breaking - Chaos Communications Conference "Capture the Signal" Event**
- **Request To Send**
- **Reimagining Amateur Radio Repeaters in the MMDVM Era**
- **Interesting Thread on digitalvoice Mailing List**
- **Bob "Coop" Cooper K6EDX / ZL4AAA is a Muted Microphone**
- **ZR > BEACON**
  - **ka9q-radio Development Continues**
  - **ezDV for FreeDV Will Be Available via TAPR**
  - **ESP32-APRS Tracker, ESP32-APRS Mini Terminal, and ESP32-LoRA Projects In Progress**
  - **Turn Island Systems Updates**
  - **Mostly DIY RF P3ST SSB Transceiver Kit for 15, 17, and 20 Meters**
  - **Project Yamhill Continued Progress**
  - **SatRover MK1 - Compact Turnkey QO-100 Ground Station**
  - **If You Can't Mag Mount an Antenna, Suction Cup It!**
  - **How Slow Scan TV Shaped The Moon**
  - **VARA New Feature - Multiple KISS Clients**
  - **Remote Radio Unit for M17 / FM Repeaters**
  - **Inside The 'Magic Radio' Protecting Russian Drones From Jamming**
  - **1500 Coordinated "Display" Drones**
  - **Software Defined *Antennas*?**
- **Updata**
- **Feedback Loop**
- **Join the *Fun* on Amateur Radio**
- **Closing The Channel**

Web version of this issue - https://www.zeroretries.org/p/zero-retries-0130

Breaking - Chaos Communications Conference "Capture the Signal" Event

This Zero Retries Interesting event is 2023-12-27 through 2023-12-30.

SDR Capture the Signal - Fun with Software Defined Radio and GNU Radio

> **What is a Capture The Signal (CTS)?**
>
> There are several riddles about digital signals, modulations and other systems to analyze with different difficulties. A CTS is one of the best possibilities to learn a lot in a short time. To be suitable for beginners and more experienced people there is an introductory part about the most important concepts of digital signal processing, gnuradio and software defined radio. The focus is on trying out things yourself than downloading a tool that does everything for you. So simply register an account for yourself and begin. :-)

Why?

To encourage you to learn interesting things about GNURadio, digital signal processing and Software Defined Radio.

When?

During 37C3 from 27.12. - 30.12.2023. You can join from anywhere, you do not need to be at 37C3 and don´t need a ticket!

My thanks to Grégoire Détrez SA6DTZ for the pointer to this event.

Leave a comment

Share

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to Bill Kreutinger KM6SLF for becoming a Paid Subscriber to Zero Retries!

My thanks to Gerry Brown KK7GAB for becoming a Paid Subscriber to Zero Retries!

Financial support is a real vote of confidence for continuing to publish Zero Retries.

Is It Really a Software Defined Radio?

*For full context see the article below - **Interesting Thread on digitalvoice Mailing List.***

My friend Larry Gadallah NM7A and I have an ongoing conversation that we periodically revisit about *what is a practical description* for a Software Defined Radio? NM7A posits (my interpretation) that a unit isn't really an SDR if its functions cannot be modified from the capabilities originally shipped with the radio *by an individual*.

My practical description of an SDR is "is the majority of the unit's functionality determined by the *software* running on the unit, or the unit's *hardware*"? As in, can additional, substantial features be added to the unit solely with *software*?

An example of a unit that meets both NM7A's and my definition of an SDR is the Analog Devices ADALM-Pluto. NM7A - I can modify the function of the unit with software of *my choosing / design*. N8GNJ - The unit's functionality is (solely) determined by the software running on the unit.

NM7A's and my discussions about SDR usually center on the FlexRadio 6xxx units. NM7A posits (again, my interpretation) that FlexRadio's 6xxx units aren't SDR because the functions of the radio cannot be modified from the capabilities originally shipped with the radio, by an individual (such as NM7A).

With my interpretation, FlexRadio's 6xxx units are SDRs because FlexRadio can add additional, substantial features to the units solely with software. But, while FlexRadio could add such features, and arguably has done so, the primary features of the FlexRadio 6xxx units are determined solely by FlexRadio[1] and not users.

After decades of digital voice use in Amateur Radio, all of which to date is encumbered in various ways by software patents, FreeDV is a refreshing change in that paradigm - a software-only, open source implementation of a capable, practical, reasonable digital voice mode developed within Amateur Radio… that hardly anyone uses because the only way to do so is external devices or cumbersome software running on a host computer.[2]

Although this discussion and the article below is about FreeDV, **the same situation applies to the M17 Project** which is open source, software-mostly digital voice and messaging developed for use on VHF / UHF with repeaters, radios, linking, and a full protocol suite.

Like FreeDV, no manufacturer of Amateur Radio VHF / UHF units / systems has yet chosen to implement M17 as a native capability… when clearly there is ample capability to do so in newly developed units such as the brand new Kenwood TH-D75A.

After watching the discussion about FreeDV (see below), and since the only practical way that FreeDV can be made to work with FlexRadio's 6xxx units is to add an external bit of hardware that can be "hooked into" SmartSDR via the APIs… I've come up with a more practical, pithy definition of whether a unit is, effectively, a Software Defined Radio worthy of the name for use in Amateur Radio:

Can a unit claimed to be a Software Defined Radio…
be made to / will it / does it *run FreeDV **on the radio***?

If no, then manufacturers as FlexRadio (to date, has not integrated FreeDV into a $2000+ radio that clearly has the hardware and software capability to do so), deserve a <insert favorite raspberry expression>.

From now on, I will be making a point at every opportunity to talk to a manufacturer of Amateur HF radios that claim to be "Software Defined Radio" to ask "Does it run FreeDV on the radio as just another mode selection"? If they reply in the negative, <insert favorite raspberry expression> *"Oh, how quaint - a Software Defined Radio that isn't capable of doing FreeDV as a native mode"*.

Or, when we *finally do get* "Software Defined Radios" for VHF / UHF, echo the above substituting "M17" for "FreeDV".

Radio Technology in the Real World - T-Mobile "Personal CellSpot"

Having “fixed the Internet problem” (see below), I decided to address the frustration of not having mobile telephony features (especially texting to non-iPhones) usable on my phone while I was working in the Faraday Cage that is N8GNJ Labs (a steel sided and roofed workshop building). Any feature that uses Internet works fine on the N8GNJ Labs Wi-Fi - *except T-Mobile’s Voice Over Wi-Fi*, which refuses to stay selected after I set it up (and confirm my address for E911).

I went to a nearby T-Mobile store to discuss the malfunction of Voice Over Wi-Fi and was told “Oh, that doesn’t *really* work”. I asked about arranging for a picocell unit, and was met with blank stares. Since there wasn’t a real sale to be had from my presence in the store (despite being outnumbered by four staffers with no other customers in the store) I was directed to call T-Mobile’s customer support to arrange for a “Cell booster”. Arranging for the “Cell booster” took 45 soul-sucking minutes on the phone, most of it on hold, of course, or listening to call center background chatter and keyboard clacking.

To T-Mobile’s credit, the unit arrived the next day. I glanced at the “Quick Start Guide” for any “gotchas”, connected Power, Ethernet, and “GPS” antenna and after an hour, I still don’t have “cell service” despite lots of indicators blinking rapidly. Upon further reading, I saw this:

> It can take up to 2 hours to complete the device set up.

Wow. **Just… *wow*.** 2 hours to do a firmware update and self-provision? As they used to say about the “new TCP/IP protocol”… same day service in a nanosecond world.

After about 2.5 hours, I get an email and text:

> Your T-Mobile 4G LTE CellSpot address has been confirmed and setup has been successful.

Uh… no. Every indicator on the unit except the POWER indicator is flashing, and half of those are amber rather than green. And, of course, no change in my ability to make a call in its presence. I’m going to have to call T-Mobile “tech support” (outside the shop) and jump through their inane first level technical support. I’m going to have some reading material in hand so I don’t go nuts. I’ll save *that* particular frustration for sometime next week after the Christmas holiday.

I really don’t know how people with minimal tech skills deal with stuff like this.

Comcast Begone! Solely Starlink

I returned the Comcast cable modem (with prejudice!) this week and my household’s Internet needs are now being nicely handled entirely by Starlink. Inside the house, Wi-Fi is handled by the newly-released Ubiquiti UniFi Express Wi-Fi Access Point. As with all “prosumer” devices, setting it up requires a higher degree of understanding of networking and wireless during setup, but once you get past that, it works very well. Despite it being located at one end of the house, it fills up my entire house with *reliable* Wi-Fi, even on 5 GHz. Credit where due - I learned about the UniFi Express from the Crosstalk Solutions YouTube channel which did a great job of explaining its capabilities.

73,

Steve N8GNJ

Leave a comment

Share

Reimagining Amateur Radio Repeaters in the MMDVM Era

By Steve Stroh N8GNJ

Because of their ubiquity, Amateur Radio repeaters can be a valuable communications resource in emergencies. But given that the vast majority of Amateur Radio repeaters are voice-only, such repeaters are of limited utility in a data-first world.

*This is something of a continuation of my article in **Zero Retries 0127** - Digital Voice or Data - Not an Either Or Choice.*

My friend Peter Dahl WA7FUS mentioned that Jonathan Naylor G4KLX had given a presentation to the Seattle-area Puget Sound Repeater Group on Multi Mode Digital Voice Modem (MMDVM). The presentation was recorded and publicly available on PSRG’s website:

> **November 2023 Educational Meeting Recording.** The video for Development of the MMDVM and the Modes that it Supports is now available: November 2023 Educational Meeting. The program was given by Jonathan G4KLX, a core contributor to MMDVM and the mind (and coder) behind MMDVM Host. MMDVM stands for Multi Mode Digital Voice Modem, and it’s an open-source framework (both hardware and software) that serves as a gateway to DMR, DSTAR, YSF, P25, and NXDN, all in one place. The program covered the digital voice modes that the MMDVM supports and the strengths and weaknesses of each.

I’m an admitted fanboy of G4KLX for his newest work on MMDVM to create the new MMDVM-TNC data mode, but I’ve never seen one of his presentations until now.

One key point I learned from G4KLX’s presentation is that he developed MMDVM so that Amateur Radio Operators could build repeaters for digital voice modes instead of being forced to buy commercial digital voice repeaters to experiment with digital voice modes over a wide area. For example, prior to MMDVM, if you wanted to bring up a Digital Mobile Radio (DMR) repeater, your choices were to buy a Motorola or Hytera DMR repeater. For D-Star, Icom. For System Fusion, Yaesu. For NXDN, you had a choice of Icom or Kenwood.

With that key knowledge, I *now have absolutely no fear* that creating a new multi-mode repeater based on MMDVM, or rebuilding an existing repeater to use MMDVM, would be breaking *any* new ground. MMDVM was released in 2015 and has been in development (in fits and starts), and repeaters based on MMDVM have been built and in use since then.

MMDVM as a digital *voice (only)* system *isn’t* too Zero Retries Interesting. Well, maybe a little as using MMDVM instead of a “hard coded” commercial repeater is an elegant hack. But voice repeaters, even digital voice repeaters… meh. It’s hard for me to find interesting conversations on actual (as in

transmitting and receiving *radio* signals, from *my* radio) repeaters rather than voice bits over Internet.

But with G4KLX developing MMDVM-TNC as a new, powerful data mode based on modern technology… that can be implemented as just another software update on existing MMDVM hardware (including repeater MMDVM hardware)… *that is Zero Retries Interesting*!

Folks, let's be honest with ourselves. In 2023 and beyond, the vast majority of existing Amateur Radio voice repeaters, including digital voice repeaters, are quiet the vast majority of the time. Such repeaters are systems in search of a productive use, and a justification of continuing their allocated frequency assignments. Yes, a few repeaters are "standing by" for emergency use and receive regular use by net activity or actual drills. A very few others have active user communities that keep them reasonably busy[3]. Many… perhaps most others, only "pretend" to be busy because they are linked in a network to other repeaters… so one conversation can be heard on many geographically separated repeaters.

Yet, there's tremendous promise and potential of Amateur Radio repeaters to be useful as a communications facility in a emergencies because they are decentralized[4], independent, and usually offer wide-area coverage.

But, again, let's be honest with ourselves folks. Trying to convey complex information by voice (other than limited tactical communications such as "dispatching" activities), in what is now a mostly data-centric world, is just *antiquated*. Fast, reliable *data communications* is now the baseline for communications being useful in an emergency. This is why AREDN and other microwave networks are growing so fast and becoming so ubiquitous - fast, reliable *data communications* have become what is primarily needed in an emergency. But AREDN is microwave, and it's hard to build microwave networks in many areas.

I posit that building new, and rebuilding existing Amateur Radio repeaters *around MMDVM* should, *rapidly*, become the new normal paradigm for Amateur Radio repeaters.

Proof of Concept - W6CX-DV

One example of an MMDVM-based repeater is the Mount Diablo Amateur Radio Club's W6CX-DV -- MultiMode Digital Voice Repeater:

> Welcome to the W6CX Digital Voice (DV) repeater! MDARC is pleased to provide our members and users within RF range with three DV modes by use of MultiMode technology. This allows more people to benefit from our wide-coverage DV repeater.
>
> **MultiMode**
>
> Our Digital Voice (DV) repeater supports D-STAR, DMR and C4FM (Fusion). When idle, the repeater listens for all 3 modes. Once a given mode like D-STAR is heard, the repeater gives preference to that mode for 20 seconds after a transmission, to preclude another mode from interrupting the QSO.
>
> We recommend, when you are about to key up, first check your radio (S-meter or receive signal strength bars) to see if the repeater is already busy with another mode. It's quick and easy to glance at your radio before first keying up.

For a lesser-used repeater that it's decided to accommodate data, add several more modes:

- MMDVM-TNC 9600 (and potentially 19,200) bps data with Forward Error Correction (FEC) - fast, reliable data communications.
- File / Bulletin Distribution using FLAMP[5]
- POCSAG paging

So, for such a repeater that accommodates data, a slight rewrite of the intro for W6CX is appropriate:

When idle, the repeater listens for all 3 digital voice modes and all 3 data modes. Once a given mode like D-STAR or MMDVM-TNC is heard, the repeater gives preference to that mode for 20 seconds after a transmission, to preclude another mode from interrupting the QSO or data transmission.

To that I would add:

Because this repeater is intended for "realtime" use by users, during "human" hours (generally 06:00 to 22:00), please refrain from using the repeater for data transfers that would occupy the repeater for more than a few minutes. Sending short emails or text messages is generally acceptable. Between 22:00 and 06:00, the repeater can be used for large data transfers - large emails, file transfers, or bulletin distribution.

Or, given that there are *many repeaters that are effectively unused* and could be repurposed for data use with little impact, reverse the above:

This repeater has been repurposed to primarily support data communications. Digital voice usage is still possible, but the repeater may be in use with a data mode for several minutes at a time while transferring email, files, or bulletins.

W6CX-DV demonstrates that multimode usage of a repeater isn't just possible… *it's being done… it's in daily use*. Such multimode repeaters aren't merely a "wave of the future" technology / capability… they're a "wave of the *present*" technology / capability.

The MMDVM-TNC data mode is still in development, but there's no need to wait for that to be completed before beginning to plan new MMDVM-based repeaters, or rebuild existing repeaters around MMDVM.

But… it's going to take some convincing… some *enthusiastic evangelism*. My first query about the possibility of building a new MMDVM-based repeater was to a Seattle-area Amateur Radio club with a highly technical membership. It didn't go very well; one party didn't even reply.

Reimagining Amateur Radio Repeaters in the MMDVM Era *is* going to be a hard slog. But I think it's something that's vital to Amateur Radio, especially as a demonstration to newer, younger tech-centric Amateur Radio Operators for whom a keyboard holds much greater interest and utility than holding a microphone to talk to a stranger.

Lastly, speaking of AREDN microwave networks, VHF / UHF repeaters used for data such as MMDVM-TNC are natural complements to (high speed *data)* microwave networks. VHF / UHF coverage is ubiquitous (at least compared to microwave networks), and data can be passed seamlessly between VHF / UHF repeater and AREDN networks with a simple gateway station(s) that have connectivity to both networks.

Please let me know what you think of MMDVM-based repeaters.

Leave a comment

Share

Interesting Thread on digitalvoice Mailing List

By Steve Stroh N8GNJ

There has been an interesting thread evolving on the digitalvoice mailing list revolving around the use of the FreeDV digital voice protocol designed for use on HF.

The original posting (root of the thread) is

Fwd: ARLB031 ARRL Hails FCC Action to Remove Symbol Rate Restrictions

Initially the discussion was about the minutiae of Emissions Designators (is FreeDV data, or voice, or ???). But then some interesting comments and observations began to emerge.

(My take - soon enough everything is going to be data with dynamic types of payloads, with a protocol ID. Let's just get rid of Emissions designators, reserved sections per mode, etc. But mine is definitely a minority opinion.)

This comment from Joanne Dow W6MKU was fun:

> Hokay. I have several SDRs. A subset of them can transmit signals. I can write SDR transmit software that takes in digital audio and directly generates a digitally modulated signal say on 14.222 MHz. Where is the SSB transmitter in this picture? Is the signal magically SSB anyway because .... why? This is magical thinking not technical thinking.
>
> That said, there is, perhaps, a point to separate speakers and listeners from typists and readers. I'll listen to arguments that are free of magical thinking that this is a pertinent point rather than a triviality. The ARRL has some good heads that seem to be utterly incapable of communicating to others in a logical fashion.
>
> I still not they are not regulating how often I can change my transmitting/receiving frequency. I figure 8000 times per second might be quite interesting. (Those were fun days in the early 70s.)

And thus the conversation diverged into parsing what transmissions are "digital" and what transmissions are "data" for the purpose of band segmentation and Emission Designators.

W6MKU weighed in again with a pithy, on-point comment:

> Everybody who remembers the SSB / AM wars raise your left hands. SSB was tried and found successful in the ham marketplace. I fear DV won't because it's not possible for the big radio manufacturers to include DV in their transceivers. They're not going to go GPL any time soon. (as in Hell freezing over?)
>
> (Donning my full on protective gear) May I suggest a shift to BSD, MIT, or Apache licenses?

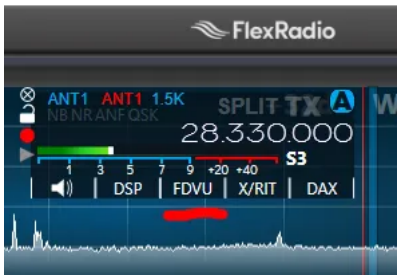
Mooneer Salem K6AQ (one of the developers of FreeDV):

> From what I understand of the LGPL, it shouldn't cause problems for the manufacturer (i.e. needing to release any source code) as long as they don't modify the FreeDV code. Even if they had to modify the Codec2 library for whatever reason, they'd only need to publish the stuff they changed.
>
> Anyway, manufacturers will be more likely to include FreeDV if (a) it's documented well enough to easily be able to integrate it (in progress) and (b) if there's demand from their customers. For those of you who want to see it in actual radios, definitely reach out to your manufacturer of choice and let them know you want FreeDV support!

Discussion now shifts to the merits of various open source licenses.

Walter Holmes K5WH:

> For anyone that did not have the opportunity to catch the online TAPR conference last Saturday, you may have missed a quiet little announcement, that has some pretty BIG implications for FreeDV, to this very point.
>
> Here's a link to the recorded session on YouTube. (1088) tapr 2023 - YouTube
>
> In particular, there were 2 presentations, for FreeDV.
>
> I gave one on the normal operation and configuration of the client software, with a small glimpse of a NEW way to use FreeDV on a Flex 6000 series radio, as well as an Icom IC-705 radio. ezDV device.
>
> This will also work with any other radio as well like the way the SM1000 does, just not as seamless as the previous 2 radios mentioned.
>
> Then Monneer-K6AQ presented the ezDV device to do this with, that he designed, and will very soon be available for purchase through the TAPR online store. Much appreciation for TAPR to recognize the need for something like this to made available for all.
>
> If your on FreeDV today, and access the FreeDV Reporter page,
>
> https://qso.freedv.org/

> you will see a few of using this device right now with excellent results, and a great deal more functionality than the Waveform implementation of many years ago. As this does NOT require ANY software to be installed on the radio itself. It just makes a wifi connection to link to the radio.
>
> Building on the really great work that Flex did as an early concept, this NEW method allows for multiple modes, Analog, 700D, 700E, 1600 for now, similar to the SM1000 modes, Voice Keyer for CQ messages, and the ability to flash new firmware over the network to stay very current with the many changes taking place in FreeDV every week or so.
>
> And this shows up on the Flex radio as 2 NEW modes, much like USB and LSB, there is now FDVU and FDVL. After you have selected the mode you want to operate in like 700D via a simple web interface, you then just select the FDVU mode on the radio, dial up the frequency like 14.236 or anything else, and use any mic you want, such as the PC mic, or the local mic on the radio, and your on the air, quick and easy.
>
> 
>
>
> As an added bonus, if your accessing your Flex 6000 series radio remotely via an Ipad, Iphone, or PC, again, you just select the FDVU mode, and your ready to go. Nothing to install on the other devices to take advantage of these features.

Does anyone else think that it's a bit… kind of missing the point of a *Software Defined Radio (SDR) to need external hardware* to add a new radio mode like FreeDV? I understand that this is an expedient way to add a function like FreeDV to a FlexRadio unit that FlexRadio, for whatever reason, chooses not to implement in FlexRadio's SmartSDR?

Bruce Perens K6BP:

> There are a few well-known problems here that are not going to be fixed without an additional rule-making. I would encourage people who are really interested in such to make one. Anyone can and I'd be happy to help, having worked on such things as removing the code testing requirement. You definitely do not need ARRL, indeed their participation is potentially of negative value because they have previously been influenced to remove a regulation-by-bandwidth NPRM by their membership, who felt it was a threat to their analog operations.
>
> Yes, modulation designators were great for describing simpler modulations but are fatally flawed in that they include the type of payload.
>
> Yes, regulating digital communication by payload is inherently flawed because it can be anything from moment to moment and generally is more than one thing.
>
> The simplest way to approach this is two-pronged:
>
> 1. File for an STA (special testing authority) that other hams can sign on to, which allows the sort of operation you want; digital communication with inherently multiple payloads, in various band segments. Note on the STA that is an experiment that is likely to result in a request for rule-making. STAs are generally easy to get. After issuance any FreeDV operator can sign on to it.
>
> 2. File for rule-making. Find someone in congress to write to FCC and encourage them to act, if they don't do so on a timely basis (this is what ARRL just did).

And, as I finish this article, the discussion continues.

For the forseeable future, Amateur Radio will probably be split between the traditionalists (that advocate segmentation by their perception of) type of signal - analog versus digital, weak signal versus stronger signals, etc. and the progressives such as W6MKU, K6BP, and myself that digital modulation (and the payload / protocol is… whatever is in vogue this week) is the wave of the *present*, and we should just get on with adapting to that reality.

To move US Amateur Radio toward modernity, I think that K6BP's advice for an STA is good. From my perspective (having participated, peripherally, in the Amateur Radio Spread Spectrum STA), the primary requirement of requesting an STA is someone / some organization that will sponsor it to do the required paperwork with the FCC and is reasonably good at herding cats in getting information from the STA participants for that paperwork.

As for getting FreeDV (and other data modes) as native modes on radios, I think us "progressives" are just going to have to campaign to the Amateur Radio HF radio manufacturers to include FreeDV as a native mode, and if they don't, adopt the attitude of *"Oh, how quaint - a Software Defined Radio that isn't capable of doing FreeDV as a native mode"*.

Leave a comment

Share

Bob "Coop" Cooper K6EDX / ZL4AAA is a Muted Microphone

> It is with a deeply saddened heart I announce the peaceful passing of my dearly loved husband, Robert Britt Cooper at 4:30 pm on May 15, 2023. "Coop", the one and only. We shared much love, laughter, pleasure, intellectual debate, and silliness together. We were best friends. I will miss him. If you would like to contact me, my name is Phoebe Beach and my email address is: matahorua@xtra.co.nz.

"Coop", as he was best known, was a pioneer… perhaps *the* pioneer in consumer / hobbyist reception of television signals via satellite. I only knew of "Coop" peripherally, from reading occasional articles about him that he was constantly engaged in a battle of wits with the television broadcasting industry

over receiving television signals from satellites. (From hazy memory…) I think I read in one of his books that his perspective was that if a company was going to transmit signals onto *his property*, he felt he had the right to do with those signals as he wanted. That included defeating the simple encryption on those early satellite video transmissions intended for network distribution to television stations and cable television systems. (Again, hazy memory…) Coop's "evangalism" about receiving video from satellites in books and articles proved, against the skepticism of the television industry, *that there was a market* for consumers receiving video via satellite, and that receiving equipment suitable for consumer use was feasible (and could be made affordable).

Coop's website - https://www.bobcooper.tv/index.html - is still online and is a fascinating archive of his eclectic career. Coop gives an awesome credit to Amateur Radio:

> If there is one thread of continuity running through the 81 years since RCA's 1938 Model 'A' it would be 'amateur' or 'ham radio' operators. Behind virtually every new creation, improvement, challenge there was a ham; a ham built the first cable TV system (Oregon - 1948), the first (NOT FCC licensed!) TV (reception) booster 'stations' (1950) and translators (1948 in Pennsylvania!); others created the first home satellite receiving systems (1976). Now, a ham has perfected the first high-quality live television via Internet technology. From 1938 until 2019, those who would control television's reception and use have deliberately worked to quash the next level of development. New technology, improving old, has routinely been labeled as 'piracy' and those who create it 'pirates'. "Television's Pirates" traces these developments and with great depth the people (hams) behind 'piracy' in 928 pages of fascinating reading.

I think I'm going to have to read Television's Pirates which is long out of print, but at least there's a copy of it in Internet Archive.

My thanks to Pseudostaffer Jeff Davis KE9V for pointing out Coop's passing.

Leave a comment

Share

ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

ka9q-radio Development Continues

At the recent TAPR Mini-DCC, Phil Karn KA9Q gave an update on his ka9q-radio software - slide deck, video.

One of the more interesting prospects for solving the many requests for a graphical user interface, especially a waterfall display, was this expedient (currently theoretical) solution:

> **Help Wanted…**
>
> - Graphical user interfaces for individual channels
> - Especially a waterfall display
> - Marry with an existing web SDR?

That last point sounds quite interesting.

---

ezDV for FreeDV Will Be Available via TAPR

Also from the recent TAPR Mini-DCC…

ezDV is essentially a standalone modem for the FreeDV digital voice mode for HF, and to date, it's been an open source development project. But now, apparently it's about to become a product. This info was only disclosed in Mooneer Salem K6AQ's presentation and slide deck:

> **TAPR to produce and sell ezDV**
>
> - TAPR is funding final testing and production
> - Target date for TAPR Store: beginning of 2024
> - Will include the ezDV board, battery and enclosure

No other details on the TAPR website or the FreeDV website.

ESP32-APRS Tracker, ESP32-APRS Mini Terminal, and ESP32-LoRA Projects In Progress

Another interesting presentation from the TAPR Mini-DCC was by Jason Rausch K4APR about several projects he's working on - ESP32-APRS Tracker, ESP32-APRS Mini Terminal, and ESP32-LoRA - presentation and slide deck. The Tracker and Mini Terminal are designed to interface with a mobile radio. The LoRa unit has an integral radio.

A few bits about **ESP32-APRS Tracker**, which has been in development for two years:

- USB-C Power/Data

- Improved transmit audio low-pass filter - Tweaked capacitor values
- More LEDs! - Power, Transmit, DCD, Receive (good) packet, Bluetooth, WIFI and GPS
- WIFI AP on Boot button
- Improved multi-decoder routines - Almost every packet is decoded
- Tracker Timeslotting - 0-60 Seconds
- Full Bluetooth support for SPP and iOS/Bluetooth LE - Full testing with Android and iOS
- Sensor Data - Voltage, Current, Temperature, Humidity and Pressure reportable in comment with tags %V, %C, %T, %H and %P

ESP32-APRS Mini Terminal:

- All features of the ESP32-APRS Tracker
- 320x240 Color TFT LCD with Resistive Touch
- Complete re-write of the graphics engine used on the original monochrome YagTracker
- All screens scaled up to fit new resolution
- Full color icons
- Map plot screen
- Includes same internal GPS and telemetry sensors
- Compact and perfect add-on to any VHF radio to make a mobile APRS station

ESP32-LoRA:

- All-in-one LoRA device - “LoRA Swiss Army Knife”
- Can be a tracker, digipeater, iGate and LoRA “modem”
- Built-in 1W UHF LoRA transceiver
- On-board GPS
- On-board sensors for Voltage, Current, Temperature, Humidity and Pressure
- Bluetooth support - SPP and BLE
- KISS over Bluetooth to any device running APRS software that supports KISS
- USB-C Power/Data Interface
- SMA ports for UHF radio and GPS receiver
- SMA-RP port for WIFI/Bluetooth

In the Q&A after his presentation, K4APR indicated that these products will likely become available in 2024 through his company - RPC Electronics.

Turn Island Systems Updates

Beacon Blaster 6 Now Supports WSPR

Email from Paul Elliott W6CXC:

> [To date,] the Beacon Blaster 6 project has successfully generated many thousands of multi-frequency FST4W spots during and since the recent solar eclipse, and has now updated software that activates WSPR operation. The wsprdaemon program has also been updated to extract spectral spreading information from WSPR spots (previously only available in the FST4W mode). This greatly expands the universe of transmitters and receivers, potentially providing massive amounts of data for ionospheric structure and propagation analysis.

From the product website:

> I’ve been running [Version Version 2.3.1] (or the previous version) for a few weeks now, and it runs well. The latest version of wsprdaemon is able to calculate spectral spreading for WSPR as well as FST4W, so there’s little reason not to switch over to WSPR.

Announcing the next stage in Beacon Blaster evolution: The WSPRSONDE-8!

Image courtesy of Turn Island Systems

Image courtesy of Turn Island Systems

> [The WSPRSONDE-8] is still in development, but the initial prototypes look very promising. Similar in many ways to the BB-6, this has the same type of frequency-flexible 1W Digital (square wave) outputs, the same GPS and 10 MHz clock reference inputs, 9-24VDC input, and USB configuration port. The WSPRSONDE-8 supports both WSPR and FST4W-120 modes.
>
> But the WSPRSONDE-8 adds these new features:
>
> - Eight frequency-flexible outputs, 1W, 160-6 meters (requires external filtering)
> - Spurious output levels greatly reduced. The BB-6 was designed to meet a spurious output level of -40dBc or better. The WSPRSONDE-8 uses a different modulation technique to provide close-in spurs typically better than -90dBc
> - A single-board design that eliminates the many subassemblies and interconnections inside the BB-6. This is a rugged system.
>
> The WSPRSOND-8 provides ultimate frequency accuracy and stability limited only by the external 10 MHz reference.

I'm continually amazed that these systems are being developed, manufactured, sold, and supported… *solo* by WB6CXC.

Mostly DIY RF P3ST SSB Transceiver Kit for 15, 17, and 20 Meters

Image courtesy of Mostly DIY RF

> After several months of development, MDRF is pleased to offer this kit version of N6QW's P3ST SSB Transceiver for 15, 17, and 20 meters. Its modular construction allows for easy assembly, testing, and modification. Most of Pete's recent designs are intended as experimenter's platforms. Any of the modules that make up the P3ST's superhet SSB architecture can be swapped out for different designs or modifications. By the way, any of the modules can be used in other homebrew rigs as well, and they will be available for sale separately.
>
> Modules plug into headers on the motherboard which carry relay-switched power. Where possible, components are spaced apart as far as possible for ease of assembly by those who suffer from FFS (fat-finger syndrome). With a standard module size--2.5 x 1 inch (5 x 6.4 cm)--and connector spacing, it will be easy to swap them out or to modify them.
>
> The regular price for the full P3ST kit (all PCB boards, components, RG173 coax, and online manual and documentation) is $109.95. As an introductory and holiday offer, the price will be $99.95 through 1/3/2024.

Unlike many low-power HF radio kits that claim to be “builder-friendly” but have a high density of components making for a complex assembly, the P3ST seems to take “builder friendly” to a more logical extreme. Those “daughterboards” look easy enough to assemble, slowly, carefully. One often vexing construction issue for such radios is assembling the coils - some people are good at it and find it easy, and some don’t find it so easy. Mostly DIY RF has a good answer:

> A set of all seven toroid coils and transformer is available pre-wound for $34.95.

The P3ST sounds like a pretty cool inexpensive, low power HF radio. I can easily imagine fabbing up a simple plexiglas enclosure to show it off.

One last thing that I didn’t quite puzzle out is the actual *controls* of the P3ST, and the announcement was cryptic about it:

> And finally, the beating heart of the P3ST: the digital VFO/BFO controller. The version pictured is interim. The version to be shipped will be on a different PC board. The controller uses the now-venerable combination of an Si5351 module controlled by Arduino software. In this case, however, the microcontroller module is a Seeed Studio Xiao with a Raspberry Pi RP2040 MCU. It will run any program intended for an Arduino (including the Si5351 and other libraries) or it can be programmed in MicroPython or Circuit Python. Digital connections to the outside world (display, rotary encoder, etc.) are made through the I2C bus.

So… there’s an external display and controls needed? To be developed? Already developed and available for use with the P3ST? (None are apparent on

the company's website.) Or a host computer? Not clear.

Project Yamhill Continued Progress

Jason Milldrum NT7S continues to make progress on *his* new design, modular, low-power HF transceiver, "Project Yamhill":

> Project Yamhill is the successor to the Willamette Transceiver, also known as the qrp-l Group Project. The purpose of this endeavor is to provide a platform to learn about radio electronics at a system level. Modules that correspond to the blocks of a block diagram will be the basis upon which different types of radio designs will be created. A modular 3D printed backplane will be the chassis, user interface, and power supply for the radio experiments. The desired goal is to have a high-performance CW QRP transceiver at the end of the main project run, however there would be the capacity to build many other types of radios from the blocks as desired, such as a SSB transceiver, run more transmit power with a linear amplifier that can provide 20 watts or more, data radio, simple receiver, different architectures such as a phasing receiver, etc.
>
> All designs and code will be permissively open sourced so that an end user is able to build one by himself if desired. All radio design specifications will be published, along with detailed information about how the user can make his own measurements with affordable test equipment to ensure that his radio is performing as expected.

His latest installment - Project Yamhill Active Audio Filter concludes with:

> **What's Next**
>
> I've got a large stockpile of various Project Yamhill PCB designs on hand, just about ready for fabrication. Plus I finished the layout of the new 80 meter CW QRP transceiver board as well, and I'm itching to get that one too. I realized that I had forgotten one additional PCB design that's necessary for an initial build: a board that gives a BNC antenna connector. This should be an easy one to knock out in an afternoon. After that, I will go back through each board design for one last review, and then should be ready to export the Gerbers and send them off to fab. Exciting times!

SatRover MK1 - Compact Turnkey QO-100 Ground Station

More detail on the product website:

> The transverter package contains the most parts to communicate via the QO100 narrow band geostationary satellite. To make your satellite ground station work. You must add the following parts:
>
> - 12V power supply (or batteries) capable of 2A
> - Satellite offset dish reflector 60 to 90 cm diameter.
> - 144MHz all mode transceiver what output power level can be reduced within a range of 0,5 to 4 Watt.
> - Coaxial cable between 144 MHz transceiver and SatRover.
>
> The SatRover is developed with simplicity in mind. The -rover- in the name means it is intended to use on portable or -rover- operation. Together with a portable 144 MHz transceiver it is small enough to put in your backpack or with your camping gear. There is no need for a computer or external frequency reference.

<Insert standard plaint about envy of European Amateur Radio Operators for having access to QO-100 and "I want one" Amateur Radio payload at GEO *for the Western hemisphere*>.

Another innovative product developed, built, sold, and supported by an talented individual Amateur Radio Operator!

My thanks to Ren Roderick K7JB for pointing this out.

If You Can't Mag Mount an Antenna, Suction Cup It!

In **Zero Retries 0127** - Tesla Cybertruck Uses 48 Volt Internal Bus, I wrote

> Another interesting wrinkle of the Cybertruck and Amateur Radio… what will we do now that we cannot use magnetic mount antennas?

In the comments of that issue, (Founding Member 0000) Steven Davidson K3FZT wrote:

> We in Philadelphia ARES whose served agency is the Southeastern PA Chapter of the American Red Cross (SEPA-ARC) have run into the problem of magmount failure as many SEPA-ARC vehicles have fiberglass bodies. Bill W3AOK has designed and built a suction cup mount which has stood up to 60MPH travel and performs well with a half-wave antenna (thus not requiring a ground plane) such as a Diamond SR-777.

Image courtesy of Steven Davidson K3FZT

Works for me!

Another interesting wrinkle of the Cybertruck is that an available option for Cybertruck (apparently can be added after purchase) integral light bar. The Cybertruck has a small panel above the passenger door, near the roof rack mount with cabling already run for control of the light bar. Given that there can

be roof mounts, and power… perhaps it makes sense for a remotely operated radio to be installed *on the roof* with the antenna? Again, I'll really be curious to see a Cybertruck outfitted with two way radios, and the requisite external antennas.

How Slow Scan TV Shaped The Moon

> The crude videos from the moon were broadcast using slow-scan television, which influenced how we came to imagine the surface of the moon. While we all know the moon isn't literally a shaky video, it's hard to fully separate visual media of the moon from our internal concept of being on the moon, and I've been looking into the technologies that form that image.

Interesting article from a non-Amateur Radio perspective. I would have commented to the author that Slow Scan TV (SSTV) is alive and well in Amateur Radio (the casual mention of Amateur Radio isn't too impressive), including Amateur Radio on the International Space Station. Unfortunately, the author has chosen to restrict commenting to paid subscribers. I could have replied to the author via email, but that kind of defeated the purpose of promoting Amateur Radio's continuing use of SSTV.

VARA New Feature - Multiple KISS Clients

In the Facebook group - **VARA APRS**, there was this interesting mention by Michael Phelps (Moderator):

> Surprise! New VARA coming tomorrow that supports multiple KISS clients! That means you can run all the things all at the same time!
>
> A few of us have been testing it. I'll post here when it's released.

There are some Facebook groups relating to Amateur Radio technical subjects, like this one, that are well-run and very informative. Another good group is EME Moonbounce Radio Communications.

Remote Radio Unit for M17 / FM Repeaters

I found this mention by Wojciech Kaczmarski SP5WWP on LinkedIn:

> Another great open source hardware design by the M17 Project - a Remote Radio Unit for M17/FM repeaters. This device will greatly reduce feedline lengths required, as it is intended to be mounted close to the antenna. This solution also dramatically reduces RFI and improves RF signal's quality, as the communication between the RRU and the controller goes through an optical fiber.
>
> rru-rf board is released under CC-BY-SA-NC license on the Project's GitHub page:
>
> https://github.com/M17-Project/rru-rf-hw

Additional detail from that page:

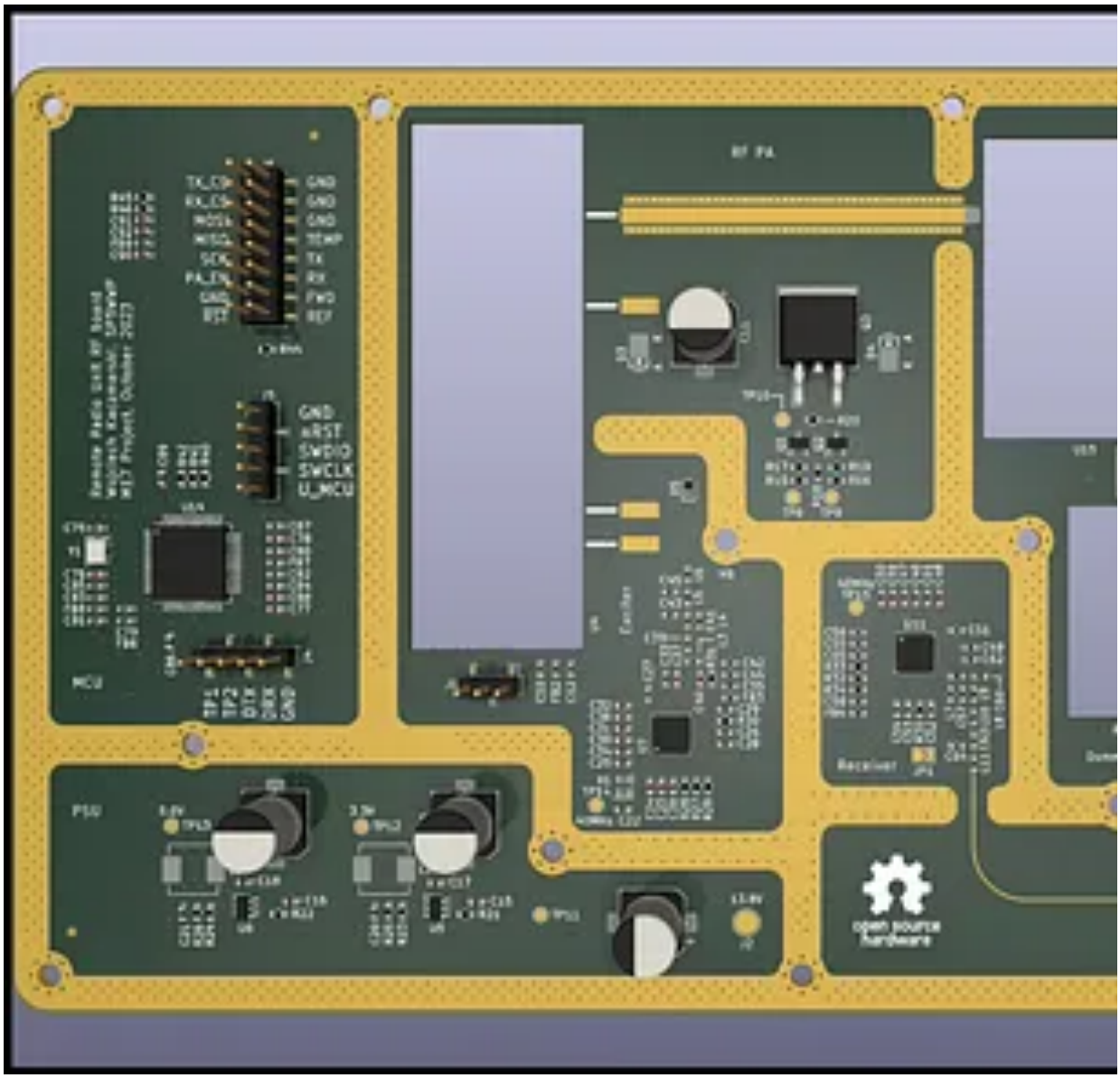


Image courtesy of M17 Project

What is it?

An FM repeater in a milled aluminum chassis. Built around a pair of CC1200 chips from Texas Instruments and an RF power amplifier module. Revision A with CC1200 RF front-ends supports various FM-based modes, including M17 and AFSK.

Quick fact sheet

- RF power module - RA60H3847M1
- RF output power - 1..60W continuous, up to 80W with lower duty cycle
- Frequency range - 420..450MHz
- Frequency error - <0.5 ppm over -40 to +85°C range
- Supply voltage - 13.8V DC
- Power consumption - <150W at 60W RF out
- Load mismatch immunity - continuous over the whole VSWR range (built in RF isolator)
- Harmonic content - 2nd <-40dBc, 3rd <-55dBc (435MHz at 48.3dBm)
- Mode support: analog FM, M17, (A)FSK
- Circulator: WH3538X-1, 400..470MHz (microstrip)

- Dummy load: Anaren J100N50X4B

Wow… a *mount on tower repeater*, with the (remoted) controller connected via fiber.

A few years ago, a low-quantities, custom "milled aluminum chassis" would have been a showstopper, but now such assemblies are common. Perhaps this too would be a good project for TAPR to get involved in.

Given that this is open source, this would be an ideal unit to marry with a MMDVM repeater controller for *all mode support*, especially data. Hopefully that's easy to implement purely at the control end of the fiber. I'm guessing that the "controller" is merely an embedded computer that can be fitted for a fiber network interface.

This is a great example of ***Technological Innovation in Amateur Radio***! Kudos SP5WWP!

Inside The 'Magic Radio' Protecting Russian Drones From Jamming

Forbes:

> The first thing DanielR notes is that while Russian Telegram channels hail the Hermes Anti-interference Communication Kit as an all-Russian creation, it is made with imported parts.
>
> "The Russians removed the labels from the most important piece, but they need not have bothered," he notes.
>
> The item is still easily identifiable as a RAK3172(H) wireless module made by Chinese company RAKwireless, which DanielR calls "an easy-to-use, small-size, low-power solution for long-range wireless data applications," available in different radio frequency bands online for $5.99.
>
> …
>
> DanielR notes that Hermes' "magic antenna with filter" looks like a half-wave dipole antenna. Because the size of antenna corresponds to the radio waves it picks up, he estimates that it operates on a frequency of about 930 Mhz. The antenna is fitted with a balun (short for "balancing unit") and a surface acoustic wave filter, both of which improve performance. DanielR says these too are commodity items costing about $.50 and $0.40 respectively.

That this approach works at all, in a battlefield scenario, is a testament to the robustness of Semtech's implementation of Chirp Spread Spectrum. If I was given license to design better radio control systems for battlefield drone use (I'd need a lot of talented help…), I'd start with a small, light, capable Software Defined Radio such as the CaribouLite RPi HAT to be able to use unconventional frequencies and modes. It's a battlefield, so the normal "polite" spectrum rules don't necessarily apply, and it's a *Software Defined Radio*… so anything (theoretically) goes, other than don't cause interference to your side's radio communications.

My thanks to Tom Salzer KJ7T for the pointer to this story. KJ7T writes The Random Wire newsletter.

1500 Coordinated "Display" Drones

The YouTube algorithm struck me again with fascinating tech that I wouldn't have known to look for.

From drones on the battlefield to the… I have no idea what this new form of large scale visualization will ultimately be called… *but it's cool*. I can't imagine the logistics and management and communications of *this* fleet of drones to put on this recent performance in North Texas, USA. This kind of large scale deployment seems (to me) to break new ground in drone endurance (especially battery life) and three dimensional spatial awareness, coordination, and lighting technology.

We keep needing better radio communications technology for things that were literally unimaginable just a generation ago.

Software Defined *Antennas*?

Nature Communications:

> **A universal metasurface antenna to manipulate all fundamental characteristics of electromagnetic waves**
>
> Metasurfaces have promising potential to revolutionize a variety of photonic and electronic device technologies. However, metasurfaces that can simultaneously and independently control all electromagnetics (EM) waves' properties, including amplitude, phase, frequency, polarization, and momentum, with high integrability and programmability, are challenging and have not been successfully attempted. Here, we propose and demonstrate a microwave universal metasurface antenna (UMA) capable of dynamically, simultaneously, independently, and precisely manipulating all the constitutive properties of EM waves in a software-defined manner. Our UMA further facilitates the spatial- and time-varying wave properties, leading to more complicated waveform generation, beamforming, and direct information manipulations. In particular, the UMA can directly generate the modulated waveforms carrying digital information that can fundamentally simplify the architecture of information transmitter systems. The proposed UMA with unparalleled EM wave and information manipulation capabilities will spark a surge of applications from next-generation wireless systems, cognitive sensing, and imaging to quantum optics and quantum information science.

Interesting Engineering had a slightly less academic summary.

I know that metamaterials have made new things possible, such as "low cost consumer" phased array antenna technology such as Starlink's "Dishy McFlatface" user terminal.

But, I'm a little confused about this "breakthrough". In my understanding of radio technology, amplitude, phase (multiple transmitters feeding multiple antennas), frequency, polarization (selection of different antennas) are all controllable (by software) attributes of a *radio* transmitter / system… not an *antenna*. Perhaps the researchers have integrated the variable aspects of a radio transmitter closely matched with a metamaterial antenna more thoroughly than previously possible.

But yeah, software defined antennas would be cool. Heck, I still think that a variable length vertical wire antennas such as those by SteppIR that can be automatically tuned when integrated with a radio are cool

Leave a comment

Share

Updata

In Zero Retries 0129 Comments, Craig Cherry N7RWB commented:

> Instead of a minimum 1.4 MHz bandwidth on 70 cm, how about 2 MHz to accommodate the DVB-T recommendations found in this issue of the excellent Boulder ATV newsletter? https://kh6htv.files.wordpress.com/2023/11/tv-rptrs-rptr-148.pdf

Which says:

> **2 MHz BANDWIDTH:** In many parts of the USA, in particular large metro areas, there is too much other RF activity on the amateur 70 cm band to allow use of the full, broadcast standard, 6 MHz bandwidth. The Hi-Des modulators and receivers are capable of operating at much lower bandwidths, down to 2 MHz. Hi-definition, 1080P resolution does not work well at 2 MHz BW, QPSK. However, excellent video performance with standard definition, 480i is possible at 2 MHz BW, even using very aggressive FEC. Going to a lower bandwidth also buys us a considerable increase in receiver sensitivity (-108dBm, 0.9µV with a pre-amp). High definition, 720P, is possible at 2 MHz BW however using 16QAM or 64QAM.

OK, point taken. My new minimum bandwidth "ask" for the pending FCC reconsideration of bandwidth limits on 420-450 MHz (70 centimeter band) should be *2 MHz* to allow for experimentation with fast data communications, LTE technology, *and* digital video communications in Amateur Radio.

Also, I concur with N7RWB's characterization (*excellent*) of the Boulder Amateur Television Club TV Repeater's REPEATER newsletter. It's publicly accessible and Zero Retries Interesting. Recommended!

Feedback Loop

Zero Retries 0129 Comments

My Thanks to commenters Steven Monsey and Craig Cherry N7RWB for some interesting comments on **Zero Retries 0129**. N7RWB offered a particularly useful comment - see Updata, above.

If you provide feedback via email, I may excerpt your feedback or include it in full. Unless you specifically grant me permission to include your name, I won't do so. Feedback may be lightly edited for clarity.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- ***Founding Members*** **who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
  Founding Member 0001 - Prefers to Remain Anonymous 01

  Founding Member 0002 - Chris Osburn KD7DVD
  Founding Member 0003 - Don Rotolo N2IRZ
  Founding Member 0004 - William Arcand W1WRA
  Founding Member 0005 - Ben Kuhn KU0HN
  Founding Member 0006 - Todd Willey KQ4FID
  Founding Member 0007 - Merik Karman VK2MKZ
  Founding Member 0008 - Prefers to Remain Anonymous 14
- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.
- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org
- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
  Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!
- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.
- TAPR Packet Status Register has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

Zero Retries is currently using the Substack email publishing platform to publish Zero Retries. It's particularly suitable for small newsletters as you can get started for no cost.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ***1100+*** other subscribers:

Subscribe now

Please tell your co-conspirators about Zero Retries — just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy — just click:

Leave a comment

If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

2023-12-22

If you'd like to reuse an article in this issue, for example for club or other newsletters, just ask. Please provide credit for the content to me and any other authors.

All excerpts from other authors or organizations, including images, are intended to be fair use. *Unless otherwise noted in the article*, there are no paid promotional items in any Zero Retries articles.

Portions Copyright © 2021, 2022, and 2023 by Steven K. Stroh.

Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I *owe* them from *way* back).

1

FlexRadio offers a (reportedly - I'm not a software developer) deep Application Programming Interface (API) that allows external software and hardware to interoperate with the SmartSDR application software of the FlexRadio 6xxx units.

2

Link is to a Kenwood dealer site because, astonishingly, Kenwood still has not updated its US Amateur Radio page on its website.

3

I've been told by a number of people that if you want to have interesting chats on repeaters with users in your local area… you should get a GMRS license and check out your local GMRS repeaters. Apparently GMRS usage in the 2020s has tapped into an entirely new demographic that likes to talk on the radio… just not on *Amateur* Radio.

4

At least in theory; hopefully linked repeaters, especially DMR linked repeaters that are heavily centralized, have network failure modes thought through and revert to standalone operation when they do not have network access.

5

FLAMP is not currently supported by MMDVM… but it's open source and thus "a simple matter of software".